

MONTANA-DAKOTA UTILITIES CO.
A Division of MDU Resources Group, Inc.

Before the Public Service Commission of North Dakota

Docket No. PU-16-666

Rebuttal Testimony
of
Alan L. Welte

1 **Q. Would you please state your name and business address?**

2 A. Yes. My name is Alan L. Welte and my business address is 400
3 North Fourth Street, Bismarck, North Dakota 58501.

4 **Q. By whom are you employed and in what capacity?**

5 A. I am the Director of Generation in the power production department
6 of Montana-Dakota Utilities Co. (Montana-Dakota or Company), a Division
7 of MDU Resources Group, Inc.

8 **Q. Are you the same Alan L. Welte who filed direct testimony earlier in
9 this proceeding?**

10 A. Yes, I am.

11 **Q. What is the purpose of your rebuttal testimony in this proceeding?**

12 A. I am responding to the testimony submitted by Richard A. Polich on
13 behalf of the North Dakota Public Service Commission Advocacy Staff
14 (Advocacy Staff) in regard to Mr. Polich's recommendation that \$12.27
15 million of Montana-Dakota's cost for the Lewis & Clark RICE (L&C RICE)
16 project be disallowed. As demonstrated in my direct testimony in this case
17 and in this rebuttal testimony, Mr. Polich's recommended disallowance is

1 unfounded and should be rejected. Montana-Dakota executed its only
2 real option to self-build the L&C RICE project with vigilance and care to
3 keep costs as low as possible while protecting our customers from the risk
4 of curtailment resulting from the load growth in the Bakken Region of
5 North Dakota and Eastern Montana. I am also sponsoring Exhibits
6 No.__(ALW-2) and (ALW-3).

7 **Q. Please summarize the reasons you believe that Mr. Polich's**
8 **recommendation to disallow approximately 36 percent of the actual**
9 **cost of the L&C RICE project, that has been providing service to**
10 **customers since January of 2016, should be rejected by the**
11 **Commission.**

12 A. I disagree with several assumptions in Mr. Polich's testimony
13 regarding his recommended disallowance:

- 14 1. Montana-Dakota did not have the option of renting generation to get
15 through the winter of 2015-2016 and Mr. Polich failed to provide
16 credible evidence that rental units were a viable option. The quotes
17 Mr. Polich obtained in 2017 are not indicative of the cost to install in
18 the Bakken area in 2015 and in fact the quotes were incomplete
19 and do not provide a full cost assessment of rental generation;
- 20 2. As addressed by Mr. Neigum, Montana-Dakota's two-year action
21 plan in the 2013 IRP, did not identify the need for the RICE units to
22 be available for the 2015-2016 winter. It was the July 2014
23 notification from Western Area Power Administration that the

- 1 transmission system would be unable to serve all loads in the area
2 with Montana-Dakota's loads first on the curtailment list;
- 3 3. Mr. Polich's assumption that an installed cost of \$1,490/kW is
4 representative of the cost to install a generation facility of the size
5 of the Lewis & Clark RICE in the Bakken Region is simply incorrect
6 and does not address many factors prevalent at that time; and
- 7 4. Mr. Polich incorrectly assesses the significance of the L&C RICE
8 being available at the end of December 2015 to service
9 emergencies and the L&C RICE schedule as not being significantly
10 shorter than a typical schedule.

11 **Q. What factors made the L&C RICE project the Company's only viable**
12 **self-build generation option?**

13 A. It would have been preferable to build a larger facility that
14 captured economies of scale under a non-expedited schedule; however
15 the timing of the critical need to mitigate the customer curtailment risk
16 precluded it as an option. Self-build generation options at different sites
17 within the Bakken Region were ruled out due to inability to timely obtain
18 land and right of way, complete siting, to obtain transmission and firm
19 natural gas service, to permit, to procure and construct a project to meet
20 the schedule. This left the Company with the option of building new
21 generation on the existing Lewis & Clark Station property at a size limited
22 by the transmission system capability; and to select the RICE units which
23 could burn natural gas of the pressure, quality, and specific composition

1 available in the Bakken Region, and for which the Company could obtain a
2 timely air permit.

3 **Q. Please explain why the use of rental generation units was not an**
4 **alternative to meet the critical reliability need during the winter of**
5 **2015–2016.**

6 A. The Lewis & Clark Station property was not an option for locating
7 rental generation units due to the lack of physical space and untenable
8 logistics during the simultaneous construction of the L&C RICE, Mercury
9 and Air Toxics, and Ash System projects.

10 Many of the same factors that precluded self-build generation
11 options at different sites within the Bakken Region would also have made
12 it impossible to use rental generation units. Montana-Dakota's experience
13 during the oil boom in the Bakken Region would suggest that the reliability
14 of rental generation units during times when critically needed would have
15 faced challenges of staffing shortages, lack of available fuel oil supply and
16 delivery, or firm natural gas supply, and ability to obtain other necessary
17 support services.

18 **Q. Provide a list of items associated with the rental unit option**
19 **suggested by Mr. Polich for which he has not included costs, and**
20 **other items for which he has not performed adequate due diligence,**
21 **and therefore have the potential to either make the rental units**
22 **technologically unviable or would result in additional costs.**

23 A. Montana-Dakota's review of Mr. Polich's testimony and confidential
24 data responses to the Company's questions confirm concerns that his

1 \$2,425,986 for Cost of Rental Unit is grossly understated and was not
2 constructed with necessary diligence to support a serious
3 recommendation to disallow \$12.27 million of Montana-Dakota's cost for
4 the Lewis & Clark RICE project. In fact, items as fundamental as air
5 permitting, transmission capability, fuel supply considerations and
6 operation of the units, if contemplated by Mr. Polich were not addressed in
7 his testimony or information provided by Mr. Polich in data responses.
8 Exhibit No.____ (ALW-2) provides a list of 34 items for which costs were
9 not included. In addition, Montana-Dakota believes Mr. Polich has failed
10 to adequately investigate a number of technical aspects of the rental
11 equipment that have the potential to either make the rental units unviable
12 or to further increase the total cost in addition to what has been identified
13 in Exhibit No.____ (ALW-2). First, the natural gas fuel in the Bakken
14 Region likely contains unacceptable levels of natural gas liquids to be
15 suitable for use with the single fuel natural gas rental units specified. This
16 would either make them unviable or would require dual fuel capabilities,
17 which would require additional fuel handling equipment, back-end
18 emissions controls equipment, and additional operating costs. The
19 additional equipment would add cost, complexity and result in
20 performance impacts. Second, the winter ambient temperature specified
21 by Mr. Polich for the rental units is grossly inadequate for the Bakken
22 Region and would either make the units unviable or would require some
23 kind of cold weather package or customized cold weather solution. Third,
24 the timing and logistics of a rental slated for a future year does not reflect

1 the reality of challenges associated with the Bakken Region in 2015, such
2 as lack of rental equipment availability, long lead times, and cost
3 premiums due to high competition. Fourth, Mr. Polich has not applied
4 correction factors to the power output ratings to reflect Bakken Region
5 elevations and MISO coincident peak temperature conditions. This would
6 likely result in a fourth rental unit being required to meet the need fulfilled
7 by the Lewis & Clark RICE project.

8 **Q. Please describe why the \$1490/kW installed cost on an existing**
9 **power plant site developed by Mr. Polich to support his**
10 **recommended disallowance of \$12.27 million of Montana-Dakota's**
11 **cost for the Lewis & Clark RICE project is incorrect.**

12 A. The Company's and Sargent & Lundy's (S&L) review of Mr.
13 Polich's testimony and specifically the GDS Cost Estimate provided in
14 response to the MDU-15 data request indicates that Mr. Polich's "Typical
15 Small Generation Cost/kW" is based on an incomplete and
16 unrepresentative estimate, and not an actual completed project cost with
17 adjustments to put it on an equivalent basis with the L&C RICE
18 constructed in the Bakken Region. Concerns with the GDS Cost Estimate
19 provided in response to MDU-15 are as follows:

- 20 1. It understates or does not include wage rates, per diem, housing
21 allowances, allowances to attract and retain labor, and productivity
22 factor experienced in the Bakken Region.
- 23 2. It understates or does not include natural gas and electric
24 transmission interconnection costs.

- 1 3. The scope of equipment supply is not delineated and appears low.
2 As a comparison the total of all Wartsila supplied equipment and
3 other equipment in the GDS cost estimate is less than the actual
4 L&C RICE Wartsila supplied equipment costs alone.
- 5 4. It does not include any costs for underground utilities. It would be
6 unusual for a project at any site to not have costs associated with
7 underground items such as electrical ductbank and sanitary and
8 other drains.
- 9 5. The structural concrete estimate appears low. As a comparison the
10 GDS estimate for this item would equate to about 700-750 cubic
11 yards of concrete. The L&C RICE project used approximately 2750
12 cubic yards of concrete.
- 13 6. The pre-engineered building cost estimate appears low. As a
14 comparison the GDS estimate for this item would equate to about a
15 2800 square foot (60 ft x 47 ft x max 30 ft H) building. This is
16 smaller than the L&C RICE engine hall alone. The estimate is not
17 large enough to include a required electrical equipment room, a
18 control room, auxiliary mechanical equipment / parts storage /
19 maintenance area, a restroom, an overhead maintenance crane, or
20 any provisions for insulation for cold weather in a northern climate
21 and noise abatement. Additionally there does not appear to be any
22 HVAC costs in the estimate for building heat and ventilation when
23 units are in operation.

1 **Q. Provide a summary of bid and award information for the L&C RICE**
2 **project equipment, materials, and services contracts.**

3 A. Exhibit No._____(ALW-3) provides a summary of the nineteen
4 major and minor L&C RICE contract bids and awards. It demonstrates the
5 Company's use of a competitive process to keep the cost as low as
6 possible while meeting the critical schedule.

7 **Q. Please provide a comparison of the S&L estimate and the Company's**
8 **budget forecast to the actual L&C RICE project cost?**

9 A. In September of 2014, S&L estimated the project at \$48.4 million.
10 In early 2015, following the award of the RICE equipment supply contract
11 and prior to the award of the General Work Contract and start of
12 construction, Montana-Dakota forecasted the L&C RICE project at \$43.6
13 million (\$41.9 million wo/ loadings and AFUDC)¹. The actual constructed
14 project cost of \$47.2 million was \$1.2 million or 2.5 percent less than the
15 S&L estimate. The actual constructed project cost exceeded the
16 Company's forecast by \$3.6 million or 8.3 percent. The difference was
17 primarily caused by increases in the natural gas and electric transmission
18 system interconnections cost, construction cost, and engineering and
19 construction management costs.

20 **Q. Explain why the cost estimate for the generic RICE unit in the**
21 **Company's 2013 Integrated Resource Plan (IRP) is understated and**
22 **is not a good comparison to the L&C RICE project actual constructed**
23 **cost.**

¹ Presented project estimate at about \$40 million in February 2015 ND PSC PIE Meeting.

1 A. There are several reasons why the 2013 IRP generic RICE and
2 other resource cost estimates are not on an equivalent basis or a good
3 comparison to the L&C RICE project actual constructed cost.

4 **Economy of Scale** – As the size of a generating facility increases the
5 Constructed cost per kW decreases. The publically available information
6 for small RICE projects of the L&C RICE size is limited; however S&L,
7 Montana-Dakota’s consultant and L&C RICE Project Engineer’s
8 experience and research suggests that for RICE facilities made up of 9
9 MW size units, the installed cost on a \$/kW basis decreases significantly
10 as additional units are installed. After approximately 50MW (5 to 6 - 9MW
11 units), the slope of a curve of the constructed cost per kW versus facility
12 rating in MW starts to level off as the economy of scale benefits are
13 realized. For small facilities (approx. 27MW and less), costs associated
14 with site development, balance of plant, construction, etc. can be approx.
15 65 – 75% of the total cost. In comparison, for larger installations (approx.
16 80MW and larger) these costs represent approx. 40 – 50%. They also
17 indicate that the installed cost for a 2 x 9 MW RICE facility can range from
18 \$1800 to \$2700/kW while a 12 x 18 MW RICE facility can range from \$900
19 to \$1400/kW. Higher cost premiums for the Bakken area construction and
20 the fast track schedule are obvious reasons why the L&C RICE cost is at
21 the high end of the range. All of the generic 2013 IRP resources including
22 the generic RICE units are larger than the L&C RICE project.

23 **Overnight Construction** – The 2013 IRP resources costs were presented
24 on an overnight cost of construction basis. The overnight cost is the cost

1 of a construction project if no escalation is incurred for materials and
2 equipment cost and no interest is incurred during construction, as if the
3 project was completed "overnight." As shown in Exhibit (ALW-1) of my
4 direct testimony, loadings and interest during construction add 3.2 to 4.5
5 percent to the total capital investment.

6 **Site Specific Adjustments** – The 2013 IRP generic resources do not
7 include site specific costs for natural gas interconnection ahead of final
8 filtration and metering (pipeline tap, pipeline, heating, cleaning,
9 compression, and regulation), transmission interconnection beyond the
10 generator step-up transformer (substation additions or modifications and
11 transmission line) and MISO system upgrade costs. By co-locating the
12 L&C RICE project on the existing Lewis & Clark Station property the
13 Company was able to reduce these costs from what they would have been
14 on a green field site. As shown in Exhibit (ALW-1) of my direct testimony
15 site specific and other costs are 6.6 to 7.5 percent of the total capital
16 investment.

17 **Equipment Configuration** – The 2013 IRP generic resources represent
18 varying equipment configurations (i.e. numbers of turbines or engines and
19 emission control equipment). Multiple turbines or engines and emission
20 control equipment along with the associated foundations, piping, wiring
21 add to the cost of the resource. To ensure that the air permit could be
22 approved expeditiously and that the L&C RICE would have operational
23 flexibility the Company installed SCR and CO emissions control
24 equipment.

1 **Quality of Estimate** – Montana-Dakota’s consultant’s estimate for the
2 generic RICE unit in the 2013 IRP was understated due to the quality of
3 the indicative OEM pricing received, as well as the lack of historical
4 information available in their construction and engineering cost estimating
5 process. Montana-Dakota has worked with the consultant to improve the
6 quality of the generic RICE resource estimates in subsequent IRP
7 processes, however, as mentioned the publically available cost
8 information for small RICE projects of the L&C RICE size is limited.

9 **Accelerated Schedule** – The project fast track schedule required bidding
10 and contract execution, as well as construction to begin before the
11 detailed design was completed. Less certainty results in increased bids
12 due to perceived risk. Later finalized design and issued for construction
13 drawings result in increased costs to expedite delivery of materials and
14 equipment and due to increased construction coordination efforts. In the
15 case of the L&C RICE project the tight schedule combined with a relatively
16 small project footprint also resulted in challenges related to stacking of
17 work groups during construction and commissioning.

18 **Bakken Area Construction** – Higher construction cost in the Bakken oil
19 field area also contributed to the higher cost of the L&C RICE project.
20 Even though there has been a slowdown in Bakken activities since the
21 L&C RICE project completion, the project construction occurred during the
22 height of the oil boom activity. At the time experts were predicting that the
23 oil boom would last for an additional 15 to 20 years. During the oil boom
24 wages for construction workers were increasing by 10 to 15 percent per

1 year. Competing projects and available manpower sources made it
2 difficult to attract and retain adequate numbers of trained, skilled and
3 productive workers. Productivity suffered with forced overtime to meet
4 schedules, the addition of semi-skilled and unskilled workers, and worker
5 turnover. Housing costs were soaring with one bedroom apartments
6 renting for \$2,000 to \$3,000 per month and motels rate ranging from \$90
7 to \$132 per night based on weekly rates. Competition for workers resulted
8 in companies paying increased wages, per diem, overtime, and other
9 incentives to attract and retain employees.

10 **Q. Please explain why Mr. Polich incorrectly assesses the L&C RICE**
11 **schedule as not significantly shorter and attempts to dismiss the**
12 **importance of the unit being available to serve emergencies at the**
13 **end of December 2015.**

14 A. The information provided by the Company's consultant used in the
15 Integrated Resource Planning estimates a non-accelerated schedule from
16 start of air permit preparation to commercial operation / punchlist
17 completion of just over 33 months. Subtracting three months for final
18 commissioning and testing to reflect a point in time when the unit would be
19 available for emergency operations still leaves a schedule of 30 months
20 which is significantly longer than the actual period of 19 months. Mr.
21 Polich's suggests a range of 24 to 30 months for a typical construction
22 schedule from initiation of engineering to commercial operation.

1 **Q. Was the self-build construction of the L&C RICE facility the best**
2 **course of action given the conditions facing the Company in mid-**
3 **2014?**

4 A. Yes. Montana-Dakota executed its only real option to self-build the
5 L&C RICE project with vigilance and care to keep costs as low as possible
6 while protecting our customers from the risk of curtailment resulting from
7 the load growth in the Bakken Region of North Dakota and Eastern
8 Montana.

9 The Company should not be penalized now for taking the actions
10 necessary to safely and reliably serve customers in a reasonably
11 economic manner given the conditions facing Montana-Dakota and all
12 service providers at that time.

13 **Q. Does this conclude your rebuttal testimony?**

14 A. Yes, it does.

RENTAL UNIT MISSING COSTS

Mr. Polich has not included costs associated with the following items in the total cost of the rental units:

1. Rental deposit (defined requirement in quote)
2. Mobilization and consumables (defined cost in quote)
3. Setup and commissioning
 - a. Supervision (defined cost in quote)
 - b. Labor crew (estimate of manhours in quote)
 - c. Construction equipment and tools (estimate of needs in quote)
4. Tear down and demobilization
 - a. Supervision (defined cost in quote)
 - b. Labor crew (estimate of manhours in quote)
 - c. Construction equipment and tools (estimate of needs in quote)
5. Operator training course (defined requirement in quote)
6. Initial transportation of rental units to site (over 1700 miles)
7. Return transportation of rental units from site (over 1700 miles)
8. External and internal cleaning of rental units prior to return shipment
9. Engineering (including generator protective relay settings)
10. Air permitting & other regulatory approvals
11. Site preparation & restoration
12. Natural gas interconnect tap and metering station
13. Natural gas piping from interconnect to rentals
14. Natural gas coalescing filter skid
15. Natural gas dewpoint heater
16. Natural gas regulation station
17. Water wash supply cart
18. Low/medium voltage cabling for auxiliary power interconnect
19. Medium voltage cabling for generator interconnect
20. Generator step-up transformer
21. High voltage electrical interconnection substation
22. Cold storage building for required spare parts inventory
23. Operating consumables and parts (fuel, oil, filters, repair parts)
24. Builder's risk insurance
25. Special form equipment insurance for full insurable value
26. Public liability insurance
27. Worker's Comp insurance
28. Emissions source testing
29. Approved operators & maintenance technicians
30. Montana property taxes
31. Any other duties, taxes, licenses, fees, permits, and assessments
32. Internal project management
33. Land purchase or lease for siting of rental units
34. Right-of-way for fuel and electrical interconnects

L&C2 RICE Contract Bid Summary [A] [M] [N]

Contract Description	Vendor 1 [B]	Vendor 2	Vendor 3	Vendor 4	Vendor 5
Reciprocating Internal Combustion Engines [C]	100%	105.0%	124.5%	141.0%	No Response
General Work Contract	100% [D]	101.1%	128.0% [E]	134.2% [E]	141.0% [E]
Project Engineer [I]	100%				
Generator Step-Up Transformer	100% [E]	91.4% [E]	129.3% [E]	130.6% [E]	Declined To Bid
	162.0% [F]	160.5% [F]			
Substation Construction Contractor [J]	100%				
Delta V DCS OPC System [H]	100%				
Pre-Engineering Building	100% [E]	130.5% [E]	476.1% [E]		
Substation Breaker [H]	100%				
Independent Testing	100%	100.4%	137.4%	Declined To Bid	
Fuel Gas Coalescing Filter Skid	100%	131.1%			
Geotech Investigation	100%	128.1%			
Underground Utilities Survey [I]	100%				
Substation Steel Structures	100% [K]	91.6%	94.6%	No Bid	
Substation Switches	100%	85.7% [L]	91.2%	102.6%	106.4%
Noise Assessment	39% [B] [G]	61% [B] [G]			
Substation PTs	100% [K]	85.6%	101.0%	No Bid	No Bid
Substation Survey [J]	100%				
Substation Arrestors	100%	112.0%	115.6%	No Bid	No Bid

Notes

- [A] Unless otherwise noted, comparisons are based on as-bid pricing with evaluated adjustments included
- [B] Selected vendor
- [C] Based on indicative pricing in \$/kW (net) from request for information
- [D] Based on post-evaluation but pre-contract adjustments
- [E] Based on unadjusted pricing
- [F] Based on pricing which includes adjustments for BOP/O&M losses
- [G] Scope split and awarded to both bidders. Percentage of aggregate total shown.
- [H] Sole sourced due to company preferred vendor for standardized equipment
- [I] Sole sourced due to existing agreement with favorable rates and familiarity with site (MATS project)
- [J] Sole sourced due to ability to meet accelerated schedule and/or technical complexity of project
- [K] Shortest lead time selected to meet accelerated schedule
- [L] Vendor not selected due to concerns with quality based on past experience
- [M] Contracts are listed in order of dollar value (largest to smallest)
- [N] Selected vendor used as baseline in determining percentages (i.e. Vendor X ÷ Vendor 1)